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ABSTRACT

Through the use of the Information Mapping and Information Blocking format, this paper discusses various means of increasing the information availability rate through compressed media. Techniques reviewed include: compressed speech, compressed media for individualization of instruction, compressed speech and remedial reading, speech compression with phonographs and reel to reel tape recorders, and compressed motion pictures and video. Included are implications of compressed media for education and suggestions for further research and technological development. (STS)

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COMPRESSED MEDIA: A NEW DIMENSION OF COMPRESSED SPEECH

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(Note: The format of this paper follows that of Information Mapping and Information Blocking. This paper has been written utilizing this technique with the intent of making this information readily available to the reader. You will note that all transitional sentences are missing. If you have further interest in this technique of writing see:

Horn, R.E., How to write information mapping: a self instructional system. Didoctic Systems Inc. Cranford, New Jersey 07016)

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I COMPRESSED SPEECH

Definition

Compressed speech is the electro mechanical process of increasing the speed of an audio recording while retaining the comprehensibility of the sound. The technique involves two processes; 1) taking time samples of the original recording and 2) restoring the pitch of the speeded tape to normal listening frequencies, therefore eliminating the "mickey mouse" effect.

Explanation

Contained within an audio recording is a great redundancy of information that is not required by the brain for comprehension. It was therefore hypothesized that portions of an audio tape may be deleted or cut out without any loss in comprehensibility. The first compressed speech tape was created by actually cutting out portions of an audio tape at fixed intervals and splicing together the remaining segments of the tape. This resulted in a fixed rate of speech compression.

Today the process is accomplished electronically by time sampling the audio message as the tape is speeded up. Several different technical processes have been developed for speech compression. The interested reader is referred to the technical articles cited at the end of this paper for a detailed explanation.

Utilization

Compressed speech is utilized today by two major groups, the blind and the medical profession. A blind person is able to listen to a recording of a book in one half to one third the time it took to record it. Many doctors receive audio tapes which are digests of current medical information. Some doctors are listening to these tapes via speech compressors.

Key Research

Research on speech compression started more than a decade ago and has concentrated on the comprehensibility and retention of compression rates that vary by as much as two to four times normal sound speed. The findings of this research has noted in general that comprehensibility begins to fall off as speech rate approaches three hundred words a minute. This finding parallels that of speeded reading. In fact, there are many parallels between reading and listening. This concept is discussed in the book, Reading and Auding (cited below). Until recently research on speech compression has been limited to fixed compression rates because inexpensive variable speed tape recorders were not available.

New Developments

Today rate controlled compressed speech (RCCS) is available at a price that begins to make it partical for research and for individuals that can benefit from its use such as the blind. The cost of a tape recorder with speech compression today is three hundred dollars. This is a far cry from seven thousand dollars which was the cost of a speech compressor only a few years ago. As the cost of this equipment continues to drop it is anticipated that students could benefit from its use. With a RCCS recorder a student could study an audio tape utilizing many of the same skills that are appropriate for reading, e.g. familiar material may be skimmed while new less familiar material may be listened to at a rate that is commensurate with an individual student's ability to comprehend the recorded material.

References

Duker, Sam ed., Time Compressed Speech: An Anthology and Bibliography in three volumes. Scarecrow Press, Metuchem, New Jersey, 1974.

Foulke, Emerson (Ph.D.), ed., CRCR Newsletter. Center for Rate-Controlled Recordings, University of Louisville, Louisville, Kentucky 40208.

Short, Sarah, A comparison of variable time-compressed speech and normal rate speech based on time spent and performance in a course taught. Syracuse University, 1975.

Sticht, Thomas G, et. al., Auding and Reading: A Developmental Model. Human Resources Research Organization, 300 N. Washington St., Alexandria, Virginia 22314.

Technical Articles

Gilmore, C.P. "New Tape Recorder gives Speed Listening" Popular Science, January, 1975.

Schiffman, Murray,"Playback Control Speeds or Slows Taped Speech without Distortion", Electronics, Vol. 47, No. 17, August 22, 1974.

II INDIVIDUALIZATION OF INSTRUCTION
RATE CONTROLLED AND COMPRESSED MEDIA

Introductory Comment

Individualizing instruction has been identified by researchers and practitioners as the most effective means of enabling a student to achieve mastery in a subject domain.

Definition

Individualized instruction is the process of: 1) determining, through diagnostic processes, the educational needs of students, 2) prescribing an educational program for the student and 3) testing the student's achievement with a criterion referenced mastery test. A second dimension of individualizing instruction is an expansion of part 2, the prescribed educational program to meet the needs of the student. This program may include any dimension of instruction including small and large group activities, cooperative projects, library inquiries, community inquiries, as well as individualized learning materials, e.g. programed instruction.

Relevant Research Aptitude Treatment Instruction

The process of prescribing the educational needs of the student assumes that educators are able to identify treatments (forms of instruction) that match the individual aptitudes of students. Researchers have found very few treatments that effectively interact with aptitudes to make a significant effect on learning. The only aptitude treatment interaction that has been found to be constantly effective is the student's rate of learning (this is also in dispute).

Examples

Examples of rate of learning are:

1) Reading speed which may vary from 75 - 800 wpm.
2) The speed in which a student completes an assignment, test, etc.
3) Various psycho motor skills as, writing, typing, responding, etc.

Relevance to RCCP

If rate of learning is a prime factor in the individualization of instruction, then providing students with the ability to vary the rate at which they view media could be potentially significant. The undertaking of research studies of the interaction of rate controlled compressed media (motion pictures, video, audio) with students' rate of learning may open the way to identifying other dimensions of aptitude treatment interactions. This research may allow us to identify a long assumed treatment regarding individual students learning ability; that some students learn better from media than they do from the printed word.

References

Cronbach, L. J. and Snow, R.E., Aptitudes and Instructional Methods: a Handbook, 1976, Irvington.

Glaser, R and Resnick, Lauren B. Instructional Psychology, Annual Review of Psychology, Vol 23, 1972, pp 242-253.

Glaser, Robert, Individuals and Learning: The New Aptitudes, Educational Researcher, American Education Research Association, 1972.

III RATE CONTROLLED COMPRESSED SPEECH AND REMEDIAL READING

Research

Some research has indicated that students can increase reading speed and comprehension if they are provided the opportunity to listen to the material they are reading during a speed reading exercise. The student varies the listening speed on the RCCS player until (s)he reaches his/her reading speed.

Probable Effect

1) Learn the correct pronunciation of unfamiliar words in context.

   The tape serves as a model either to reinforce correct pronunciation or to counteract faulty pronunciation.

2) Isolate word attack problems.

   Practicing word attack skills during a speed reading exercise is counter productive.

3) Improve comprehension level.

   The student's listening vocabulary is greater than his/her reading vocabulary.

4) Improve attention and concentration behaviors.

   Earphones eliminate distractions and permit deeper concentration. Speeded listening and reading further improves attending behavior because two receptor modes are engaged in attending to a message at speeds faster than they are normally perceived, but more in tune with the student's cognitive ability to receive and interpret the message.

Associated Uses

Reading

Some of the effects of compressed speech are helpful to the instructor in that they serve as diagnostic tools. If a student's comprehension scores are significantly higher when he is auding and reading, the instructor should be alerted that the student may need word attack remediation in order to become an independent reader. On the other hand, if the comprehension scores remain low, it can be assumed the difficulty level of the material is too high for that particular student.

Zoology

One professor plans to have a zoology textbook recorded to allow students to listen via RCCS as they read the text. It is hypothesized that students who have difficulty decoding complex zoological terms will be less discouraged and consequently they will read and retain more of the text if they listen to it simultaneously. It is anticipated that they will learn correct pronunciation of complex terms. It is also anticipated that the students will eventually learn sufficient terminology to become free of the RCCS.

References

Sticht, Thomas G., et. al., Auding and Reading: A Developmental Model, Human Resources Research Organization, 300 N. Washington Street, Alexandria, Virginia 22314.

Winters, Shirley, N., An Investigation of Compressed Speech as an Alternative to Reading, Hofstra University, 1973.

Winters, Shirley N., Speeded Listening: A Promising Path to Remediation of Reading Disabilities, Hofstra University, 1975.

IV SPEECH COMPRESSION WITH THREE SPEED PHONOGRAPHS AND REEL TO REEL TAPE RECORDERS

Introduction

Speech compression at fixed rates may be achieved through the utilization of Cambridge Research's VSC-M7 Pitch Correction Module in conjunction with phonographs with speed controls, e.g. 33 1/3, 45, and 78 rpm, and reel to reel tape recorders with speed controls of 1 7/8, 13 3/4, 7 1/2, 15 ips.

Procedure

Simply insert (wire) the Pitch Correction Module between the audio source and earphones.

Results Phonograph

With a phonograph record recorded at 33 1/3 rpm, one may listen to a spoken word recording compressed at 135% (45 rpm) and 234% (78 rpm). This represents fixed compression rates of approximately 1 1/3 times and 2 1/3 times the normal sound speed.

One would listen to a 20 minute 33 1/3 rpm recording 1) at 45 rpm in 13 minutes and 2) at 78 rpm in 8 1/2 minutes.

Reel to Reel Tape Recorder

With a reel to reel tape recorder, a tape recorded at a slower speed may be played back at the next fastest speed. This will provide the listener with a speech compression rate of 200% or two times normal speed. One would listen to a recording in one half of the time it took to record the message.

Equipment

Audio

VSC-M7 Pitch Correction Module
Speech Compression Module
VSC Company
2088 Union Street
San Francisco, California 94123

V COMPRESSED MOTION PICTURES AND COMPRESSED VIDEO

Introduction	Motion pictures and television recordings may be compressed provided the equipment utilized has variable speed motor controls (see equipment listed below).
Procedure	Simply insert (wire) the Pitch Correction Module between the audio source and the earphones.
Results: video to motion picture	A video tape and motion picture may be viewed and listened to comprehensibly at rates of from .5 to 3 times normal viewing speeds.
Implications students	Students may study motion pictures or television programs at a rate that is commensurate with their ability to absorb and comprehend the content.
faculty	Faculty would use it for preview of materials.
Limiting Factors	The rate of comprehension of any form of learning material is dependent on a number of variables namely: 1) density of content, 2) student's familiarity with subject matter, and 3) students' listening vocabulary in context.
Comment	This equipment provides the student with complete control of the medium. (s)He may stop the motion to study a "frame" of information, repeat a portion as many times as necessary, look at material in slow motion or peruse it very rapidly at 3 times sound speed in video and 10 times sound speed with motion picture.
Equipment	Audio VSC-M7 Pitch Correction Module VSC Company, 2088 Union St., San Francisco, CA 94123 Motion Picture Magnasync/Moviola, Model M-84-16 $3895.00 Moviola Corporation Video Joystick Search Module SM-2 $1,800.00 Convergence Corporation For use with: Sony VO2800, VO2850, VO2850A (VP2600, VP2000 - require new motors) BVU200 and JVC8300

Implications

To some individuals increasing the speed of audio and visual messages is offensive. To them it is just another factor characteristic of an age that is moving too fast. Why aggravate the human condition more, they argue, by speeding up the input of information.

It must be made very clear at the onset that there is nothing in the scope of this proposal to suggest that every individual must view media at an increased speed. The beauty of the concept is that everyone now can view the medium at a rate that is personally comfortable. Rate Controlled Compressed Media represents a potential time saving for everyone using the concept. For students this represents a means of attaining course objectives through a more efficient use of time. When listening and viewing course materials that are unfamiliar, a slower speed may be used but when reviewing the material for an examination the now familiar material may be viewed at a highly compressed rate. For a faculty member desiring to become familiar with the content of a film in a subject domain in which he/she is an expert, compressed motion pictures represents a highly efficient means of achieving an otherwise tedious end. For a researcher desiring to search for specific points of information, compressed media also represents a degree of efficiency which many will applaud.

From another perspective, until this moment in time, the viewer/listener has been at the mercy of, controlled by, or paced by the medium. The person in control has been the producer/director. In some cases, especially in the entertainment field, when the producer/director is an artist, the viewer/listener has been treated to an experience of worth and value. So frequently though, in the domain of educational media, the producer/director is not an artist, but more, a disseminator of information. It is therefore more appropriate for the searcher/inquirer to scan the tapes for the specific information being sought or, in another sense, for the student to be in control of the rate at which (s)he studies the materials.

This argument receives support by research in reading and study skills where students are taught strategies of search, to gain an overview or cognitive map of the materials, and to review the material in depth in order to fill in the details of the map. Imagine how much more meaning a student would gain from a media presentation if (s)he were in control of the rate of presentation and could employ effective study skills when viewing the presentation.

The potential contributions of compressed media seem evident. Research will be necessary to define the parameters of effective use of compressed media. A great deal of this work has been completed in the domain of audio recordings. Compressed motion may well follow the findings in the audio field. A limiting factor is the availability of equipment at a price that will make it practical for schools and colleges to make this resource available for student use.